QUIZ NAVIGATION

1 2 3 4 5
6 7 8 9 10
11 12 13 14 15
16 17 18 19

Show one page at a time
Finish review

Started on	Sunday, 20 October 2024, 5:41 AM
State	Finished
Completed on	Sunday, 20 October 2024, 6:09 AM
Time taken	28 mins 31 secs
Marks	14.00/19.00
Grade	**7.37** out of 10.00 (**73.68**%)

Question 1
ID: 54030
Correct
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QT is prescribed ondansetron as a preventative medication for chemotherapy-induced nausea & vomiting.

Which of the following statements best represents ondansetron's mechanism of action?

Select one:

- Blocks presynaptic 5-HT3 receptors on the gastric wall ✔ *Rose Wang (ID:113212) this answer is correct. Ondansetron is a selective 5-HT3 receptor antagonist.*
- Stimulates visceral pathways that inhibit nausea and vomiting ✖
- Increases levels of substance P which inhibits medulla activity ✖
- Inhibits dopamine receptors in the chemotherapy trigger zone ✖

Correct
Marks for this submission: 1.00/1.00.

TOPIC: Chemotherapy-Induced Side Effects

LEARNING OBJECTIVE:

To understand the mechanism of action of supportive medications used in chemotherapy.

BACKGROUND:

It is postulated that chemotherapy and radiotherapy induce nausea and vomiting through the stimulation of serotonin (5-HT3) receptors on the small intestine and the release of serotonin from the chemoreceptor trigger zone (CTZ).

Ondansetron is commonly used for the prevention and treatment of chemotherapy and radiotherapy-induced nausea and vomiting. It is a selective 5-HT3 receptor antagonist that works both peripherally and centrally. Ondansetron blocks pre-synaptic 5-HT3 receptors on the gastric wall and select receptors in the chemoreceptor trigger zone and the peripheral vagal nerve terminals.

Ondansetron is a substrate of many CYP450 enzymes, including CYP3A4 (major), CYP1A2 (minor), CYP2C9 (minor), CYP2D6 (minor), and CYP2E1 (minor).

RATIONALE:

Correct Answer:

- **Blocks presynaptic 5-HT3 receptors on the gastric wall** - Ondansetron is a selective 5-HT3 receptor antagonist.

Incorrect Answers:

- **Stimulates visceral pathways that inhibit nausea and vomiting** - This is not the mechanism of action of ondansetron.
- **Increases levels of substance P which inhibits medulla activity** - This is not the mechanism of action of ondansetron.
- **Inhibits dopamine receptors in the chemotherapy trigger zone** - This is not the mechanism of action of ondansetron.

TAKEAWAY/KEY POINTS:

Ondansetron is a selective 5-HT3 receptor antagonist that is used for the prevention and treatment of chemotherapy-induced nausea and vomiting.

REFERENCE:

[1] Serotonin 5-HT3-Receptor Antagonists. In: Compendium of Pharmaceuticals and Specialties. Ottawa, ON: Canadian Pharmacists Association. https://myrxtx.ca.

The correct answer is: Blocks presynaptic 5-HT3 receptors on the gastric wall

Question 2
ID: 55489
Correct

THE NEXT 5 QUESTIONS INCLUSIVE REFER TO THE FOLLOWING CASE:

Flag question

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FT is a 45 year old male with hypertension and hypercholesterolemia. He is currently taking chlorthalidone 12.5 mg and simvastatin 40 mg daily. FT was recently diagnosed with colon cancer and will be beginning his first round of chemotherapy in two days.

FT arrives at your clinic with the following prescriptions for prevention of nausea and vomiting:

- **Ondansetron 8 mg on day 1**
- **Aprepitant 125 mg on day 1, aprepitant 80 mg on days 2 and 3**
- **Dexamethasone 12 mg on day 1, dexamethasone 8 mg on days 2 and 3**

Based on FT's anti-emetic regimen, which emetogenic risk category is his chemotherapy classified under?

Select one:

- Moderately emetic ✔ — *Rose Wang (ID:113212) this answer is correct. This is the correct risk category because of aprepitant.*
- Highly emetic ✖
- Low emetogenicity ✖
- Minimally emetic ✖

Correct

Marks for this submission: 1.00/1.00.

TOPIC:

Chemotherapy-Induced Side Effects

LEARNING OBJECTIVE:

To understand the classifications of chemotherapy-induced nausea and vomiting (CINV), the emetogenic risk of different chemotherapies, and anti-emetic treatments.

BACKGROUND:

Chemotherapy-induced nausea and vomiting (CINV) is one of the most common and debilitating side effects of chemotherapy. There are three distinct classifications of CINV: acute, delayed, and anticipatory. Acute emesis refers to nausea and/or vomiting beginning within 1 to 2 hours post-chemotherapy and peaking at 4 to 6 hours. Any emesis occurring more than 24 hours after therapy is defined as delayed emesis. Patients who have experienced significant emesis in previous chemotherapy cycles often experience nausea and/or vomiting prior to treatment, otherwise known as anticipatory emesis.

The risk of emesis occurring during treatment largely depends on the intrinsic emetogenicity of the chemotherapy agent. Other factors like sex (e.g. female), age, and history of low alcohol consumption have been associated with higher emesis risk for individual patients, however, these factors are not used in the emetogenic risk classification for chemotherapy.

International guidelines use the following scale to classify the emetogenic potential of chemotherapy agents (without accounting for prophylaxis anti-emetic use):

- Highly emetic: >90% risk of emesis
- Moderately emetic: >30 - 90% risk of emesis
- Low emetogenicity: 10 - 30% risk of emesis
- Minimally emetic: <10% risk of emesis

There are three main drugs used as prophylactic anti-emetics in CINV. They are 5-HT3 receptor antagonists (e.g. ondansetron), neurokinin-1 receptor (NK1R) antagonists (e.g. aprepitant), and glucocorticosteroids (e.g. dexamethasone). Studies have shown that with individual or combination use, these medications are effective in preventing both acute and delayed emesis in the setting of intravenously delivered chemotherapies. Risk categories of drugs and their associated therapies are listed below:

Emetic Risk Group of Drug	Prevention of ACUTE CINV
High	5-HT3 + DEX + NK1 + Olanzapine
Moderate	5-HT3 + DEX + NK1
Low	5-HT3 or DEX or DOP
Minimal	None

Other medications like olanzapine, metoclopramide and prochlorperazine are also used, either individually or in combination, to confer additional emetic protection. In particular, olanzapine and prochlorperazine are often used as rescue therapy on an "as needed" basis for breakthrough CINV. Treatment for anticipatory emesis includes adequate control of CINV from the first cycle, benzodiazepines, and/or behavioral therapy.

RATIONALE:

Correct Answer:

- ***Moderately emetic*** - This is the correct risk category because of aprepitant.

Incorrect Answers:

- ***Highly emetic*** - *This is not the correct risk category.*
- ***Low emetogenicity*** - *This is not the correct risk category.*
- ***Minimally emetic*** - *This is not the correct risk category.*

TAKEAWAY/KEY POINTS:

5-HT3 receptor antagonists (e.g. ondansetron), neurokinin-1 receptor (NK1R) antagonists (e.g. aprepitant), and glucocorticosteroids (e.g. dexamethasone) and olanzapine are the mainstay of treatment for chemotherapy-induced nausea and vomiting (CINV).

REFERENCES:

[1] Hesketh, PJ. Prevention and treatment of chemotherapy-induced nausea and vomiting in adults. In: Drews R, ed. *UpToDate*. Waltham, MA.: UpToDate; 2016. www.uptodate.com.

[2] Roila F, Molassiotis A, Herrstedt J, et al. MASCC and ESMO consensus guidelines for the prevention of chemotherapy and radiotherapy-induced nausea and vomiting. Ann Oncol. 2016;27:v119-v133.

The correct answer is: Moderately emetic

Question 3

ID: 54026

Correct

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Following FT's first chemotherapy treatment, he calls the clinic reporting significant nausea over the last 24 hours. He has been feeling "sick to his stomach" and wanted to "throw up" the entire evening of day 1. He has not been able to eat anything since coming home from the hospital and feels extremely weak and nauseous. Upon further questioning, FT tells you that he did not fill his prescription for aprepitant due to its high cost. He was not provided any rescue medications for breakthrough chemotherapy-induced nausea and vomiting (CINV).

What is the reason for FT's symptoms and what is the next step in management?

Select one:

- He is experiencing acute CINV and requires aprepitant as rescue therapy ✖
- He is experiencing acute CINV and requires olanzapine as rescue therapy ✔

Rose Wang (ID:113212) this answer is correct. He is experiencing acute CINV and requires olanzapine.

- He is experiencing delayed CINV and requires olanzapine as rescue therapy ✖
- He is experiencing delayed CINV and requires aprepitant as rescue therapy ✖

Correct

Marks for this submission: 1.00/1.00.

TOPIC: Chemotherapy-Induced Side Effects

LEARNING OBJECTIVE:

To identify a patient's CINV classification and understand the therapeutic alternatives for anti-emetic treatment.

BACKGROUND:

Chemotherapy-induced nausea and vomiting (CINV) is one of the most common and debilitating side effects of chemotherapy. There are three distinct classifications of CINV: acute, delayed, and anticipatory. Acute emesis refers to nausea and/or vomiting beginning within 1 to 2 hours post-chemotherapy and peaking at 4 to 6 hours. Any emesis occurring more than 24 hours after therapy is defined as delayed emesis. Patients who have experienced significant emesis in previous chemotherapy cycles often experience nausea and/or vomiting prior to treatment, otherwise known as anticipatory emesis.

The risk of emesis occurring during treatment largely depends on the intrinsic emetogenicity of the chemotherapy agent. Other factors like sex (e.g. female), age, and history of alcohol consumption have been associated with higher emesis risk for individual patients, however, these factors are not used in the emetogenic risk classification for chemotherapy.

International guidelines use the following scale to classify the emetogenic potential of chemotherapy agents (without accounting for prophylaxis anti-emetic use):

- Highly emetic: >90% risk of emesis
- Moderately emetic: >30 - 90% risk of emesis
- Low emetogenicity: 10 - 30% risk of emesis
- Minimally emetic: <10% risk of emesis

There are three main drugs used as prophylactic anti-emetics in CINV. They are 5-HT3 receptor antagonists (e.g. ondansetron), neurokinin-1 receptor (NK1R) antagonists (e.g. aprepitant), and glucocorticosteroids (e.g. dexamethasone). Studies have shown that with individual or combination use, these medications are effective in preventing both acute and delayed emesis in the setting of intravenously delivered chemotherapies.

Examples of emetic risk categories and associated therapies is listed below:

Emetic Risk Group of Drug	Prevention of ACUTE CINV

Emetic Risk Group of Drug	Prevention of ACUTE CINV
High (non-AC)	5-HT3 + DEX + NK1
High (AC)	5-HT3 + DEX + NK1
Moderate (carboplatin)	5-HT3 + DEX + NK1
Moderate (non-carboplatin)	5-HT3 + DEX
Low	5-HT3 or DEX or DOP
Minimal	None

Other medications like olanzapine, metoclopramide and prochlorperazine are also used, either individually or in combination, to confer additional emetic protection. In particular, olanzapine and prochlorperazine are often used as rescue therapy on an "as needed" basis for breakthrough CINV. Treatment for anticipatory emesis includes adequate control of CINV from the first cycle, benzodiazepines, and/or behavioral therapy.

RATIONALE:

Correct Answer:

- **He is experiencing acute CINV and requires olanzapine as rescue therapy** - He is experiencing acute CINV and requires olanzapine.

Incorrect Answers:

- **He is experiencing acute CINV and requires aprepitant as rescue therapy** - Aprepitant is only used for CINV prevention, not as rescue therapy.
- **He is experiencing delayed CINV and requires olanzapine as rescue therapy** - He is not experiencing delayed CINV.
- **He is experiencing delayed CINV and requires aprepitant as rescue therapy** - Aprepitant is only used for CINV prevention, not as rescue therapy.

TAKEAWAY/KEY POINTS:

Aprepitant, a neurokinin-1 receptor antagonist, is used in the prevention of CINV while olanzapine is used as rescue therapy for breakthrough CINV.

REFERENCE:

[1] Hesketh, PJ. Prevention and treatment of chemotherapy-induced nausea and vomiting in adults. In: Drews R, ed. *UpToDate*. Waltham, MA.: UpToDate; 2016. www.uptodate.com.

[2] Roila F, Molassiotis A, Herrstedt J, et al. MASCC and ESMO consensus guidelines for the prevention of chemotherapy and radiotherapy-induced nausea and vomiting. Ann Oncol. 2016;27:v119-v133.

The correct answer is: He is experiencing acute CINV and requires olanzapine as rescue therapy

Question 4

ID: 54027

Correct

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A few months later, FT comes back to the clinic. Despite sufficient prophylactic anti-emetics including aprepitant, he still experienced breakthrough nausea for days after his last chemotherapy cycle. FT wants to know what else can be done to manage his nausea.

Which one of the following options would you recommend for FT?

Select one:

- Increase dose of aprepitant to 125 mg on days 2 and 3 ✖
- Add prednisone 10 mg PRN ✖
- Add prochlorperazine 10 mg PRN ✔ *Rose Wang (ID:113212) this answer is correct. This is an effective option for breakthrough CINV.*
- Increase dose of dexamethasone to 12 mg on days 2 and 3 ✖

Correct

Marks for this submission: 1.00/1.00.

TOPIC: Chemotherapy-Induced Side Effects

LEARNING OBJECTIVE:

To understand the therapeutic alternatives for anti-emetic treatment, particularly for breakthrough CINV.

BACKGROUND:

Chemotherapy-induced nausea and vomiting (CINV) is one of the most common and debilitating side effects of chemotherapy. There are three distinct classifications of CINV: acute, delayed, and anticipatory. Acute emesis refers to nausea and/or vomiting beginning within 1 to 2 hours post-chemotherapy and peaking at 4 to 6 hours. Any emesis occurring more than 24 hours after therapy is defined as delayed emesis. Patients who

have experienced significant emesis in previous chemotherapy cycles often experience nausea and/or vomiting prior to treatment, otherwise known as anticipatory emesis.

The risk of emesis occurring during treatment largely depends on the intrinsic emetogenicity of the chemotherapy agent. Other factors like sex (e.g. female), age, and history of alcohol consumption have been associated with higher emesis risk for individual patients, however, these factors are not used in the emetogenic risk classification for chemotherapy.

International guidelines use the following scale to classify the emetogenic potential of chemotherapy agents (without accounting for prophylaxis anti-emetic use):

- Highly emetic: >90% risk of emesis
- Moderately emetic: >30 - 90% risk of emesis
- Low emetogenicity: 10 - 30% risk of emesis
- Minimally emetic: <10% risk of emesis

There are three main drugs used as prophylactic anti-emetics in CINV. They are 5-HT3 receptor antagonists (e.g. ondansetron), neurokinin-1 receptor (NK1R) antagonists (e.g. aprepitant), and glucocorticosteroids (e.g. dexamethasone). Studies have shown that with individual or combination use, these medications are effective in preventing both acute and delayed emesis in the setting of intravenously delivered chemotherapies. Dexamethasone concentration increases with concomitant aprepitant use, therefore the dose of dexamethasone must be reduced.

Other medications like olanzapine, metoclopramide and prochlorperazine are also used, either individually or in combination, to confer additional emetic protection. In particular, olanzapine and prochlorperazine are often used as rescue therapy on an "as needed" basis for breakthrough CINV. Treatment for anticipatory emesis includes adequate control of CINV from the first cycle, benzodiazepines, and/or behavioral therapy.

RATIONALE:

Correct Answer:

- **Add prochlorperazine 10 mg PRN** - This is an effective option for breakthrough CINV.

Incorrect Answers:

- **Increase dose of aprepitant to 125 mg on days 2 and 3** - This will not be effective for breakthrough CINV.
- **Add prednisone 10 mg PRN** - Prednisone is not used for breakthrough CINV.
- **Increase dose of dexamethasone to 12 mg on days 2 and 3** - When combined with aprepitant, the dexamethasone dose should be reduced due to a drug interaction.

TAKEAWAY/KEY POINTS:

Olanzapine and prochlorperazine are effective therapeutic alternatives for breakthrough CINV.

REFERENCE:

[1] Hesketh, PJ. Prevention and treatment of chemotherapy-induced nausea and vomiting in adults. In: Drews R, ed. *UpToDate*. Waltham, MA.: UpToDate; 2016. www.uptodate.com.

[2] Roila F, Molassiotis A, Herrstedt J, et al. MASCC and ESMO consensus guidelines for the prevention of chemotherapy and radiotherapy-induced nausea and vomiting. Ann Oncol. 2016;27:v119-v133.

The correct answer is: Add prochlorperazine 10 mg PRN

Question 5

ID: 54028

Correct

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FT also tells you that he is very worried about the next round of chemotherapy. He understands the need for chemotherapy and is hopeful that his body will respond. He mentions that he is looking for something to help "calm his nerves" before going to the hospital. He feels sick just thinking about potential nausea and vomiting following his treatment at the hospital.

Which of the following medications would you recommend to FT to help with these apprehensions?

Select one:

- Dimenhydrinate ✖
- Prochlorperazine ✖
- Lorazepam ✔ — *Rose Wang (ID:113212) this answer is correct. Benzodiazepines are recommended for anticipatory CINV.*
- Metoclopramide ✖

Correct

Marks for this submission: 1.00/1.00.

TOPIC: Chemotherapy-Induced Side Effects

LEARNING OBJECTIVE:

To identify anticipatory CINV and understand its treatment options.

BACKGROUND:

Chemotherapy-induced nausea and vomiting (CINV) is one of the most common and debilitating side effects of chemotherapy. There are three distinct classifications of CINV: acute, delayed, and anticipatory. Acute emesis refers to nausea and/or vomiting beginning within 1 to 2 hours post-chemotherapy and peaking at 4 to 6 hours. Any emesis occurring more than 24 hours after therapy is defined as delayed emesis. Patients who have experienced significant emesis in previous chemotherapy cycles often experience nausea and/or vomiting prior to treatment, otherwise known as anticipatory emesis.

The risk of emesis occurring during treatment largely depends on the intrinsic emetogenicity of the chemotherapy agent. Other factors like sex (e.g. female), age, and history of alcohol consumption have been associated with higher emesis risk for individual patients, however, these factors are not used in the emetogenic risk classification for chemotherapy.

International guidelines use the following scale to classify the emetogenic potential of chemotherapy agents (without accounting for prophylaxis anti-emetic use):

- Highly emetic: >90% risk of emesis
- Moderately emetic: >30 - 90% risk of emesis
- Low emetogenicity: 10 - 30% risk of emesis
- Minimally emetic: <10% risk of emesis

There are three main drugs used as prophylactic anti-emetics in CINV. They are 5-HT3 receptor antagonists (e.g. ondansetron), neurokinin-1 receptor (NK1R) antagonists (e.g. aprepitant), and glucocorticosteroids (e.g. dexamethasone). Studies have shown that with individual or combination use, these medications are effective in preventing both acute and delayed emesis in the setting of intravenously delivered chemotherapies.

Other medications like olanzapine, metoclopramide and prochlorperazine are also used, either individually or in combination, to confer additional emetic protection. In particular, olanzapine and prochlorperazine are often used as rescue therapy on an "as needed" basis for breakthrough CINV. Treatment for anticipatory emesis includes adequate control of CINV from the first cycle, benzodiazepines (e.g. lorazepam), and/or behavioral therapy.

RATIONALE:

Correct Answer:

- **Lorazepam** - Benzodiazepines are recommended for anticipatory CINV.

Incorrect Answers:

- **Dimenhydrinate** - This is not the most appropriate medication for anticipatory CINV.
- **Prochlorperazine** - This is not the most appropriate medication for anticipatory CINV.
- **Metoclopramide** - This is not the most appropriate medication for anticipatory CINV.

TAKEAWAY/KEY POINTS:

Benzodiazepines (e.g. lorazepam) are used to treat anticipatory CINV.

REFERENCE:

[1] Hesketh, PJ. Prevention and treatment of chemotherapy-induced nausea and vomiting in adults. In: Drews R, ed. *UpToDate*. Waltham, MA.: UpToDate; 2016. www.uptodate.com.

[2] Roila F, Molassiotis A, Herrstedt J, et al. MASCC and ESMO consensus guidelines for the prevention of chemotherapy and radiotherapy-induced nausea and vomiting. Ann Oncol. 2016;27:v119-v133.

The correct answer is: Lorazepam

Question 6

ID: 54029

Correct

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FT mentions before he leaves that he has had trouble sleeping following his prescribed regimen.

Which of the following medications is most likely the cause of this adverse event?

Select one:

- Dexamethasone ✔ — *Rose Wang (ID:113212) this answer is correct. Corticosteroids often cause insomnia.*
- Aprepitant ✖
- Chlorthalidone ✖
- Ondansetron ✖

Correct

Marks for this submission: 1.00/1.00.

TOPIC: Chemotherapy-Induced Side Effects

LEARNING OBJECTIVE:

To identify the various side effects of anti-emetic medications in chemotherapy-induced nausea and vomiting (CINV).

BACKGROUND:

There are three main drugs used as prophylactic anti-emetics in CINV. They are 5-HT3 receptor antagonists (e.g. ondansetron), neurokinin-1 receptor (NK1R) antagonists (e.g. aprepitant), and glucocorticosteroids (e.g. dexamethasone). Studies have shown that with individual or combination use, these medications are effective in preventing both acute and delayed emesis in the setting of intravenously delivered chemotherapies.

The most common side effects associated with aprepitant are hiccups, weakness, constipation, and diarrhea. 5-HT3 receptor antagonists (i.e. ondansetron, granisetron, palonosetron) are well-tolerated, with headaches and constipation as primary adverse effects. Systemic corticosteroid use, particularly with short-term dexamethasone use, is associated with insomnia, hypertension, and hyperglycemia.

RATIONALE:

Correct Answer:

- **Dexamethasone** - Corticosteroids often cause insomnia.

Incorrect Answers:

- **Aprepitant** - Insomnia is not a common side effect.
- **Chlorthalidone** - Insomnia is not a common side effect.
- **Ondansetron** - Insomnia is not a common side effect.

TAKEAWAY/KEY POINTS:

Short-term systemic dexamethasone therapy is associated with insomnia, hypertension, and hyperglycemia.

REFERENCE:

[1] Hesketh, PJ. Prevention and treatment of chemotherapy-induced nausea and vomiting in adults. In: Drews R, ed. *UpToDate*. Waltham, MA.: UpToDate; 2016. www.uptodate.com.

[2] Serotonin 5-HT3-Receptor Antagonists. In: Compendium of Pharmaceuticals and Specialties. Ottawa, ON: Canadian Pharmacists Association. https://myrxtx.ca.

[3] Emend®. In: Compendium of Pharmaceuticals and Specialties. Ottawa, ON: Canadian Pharmacists Association. https://myrxtx.ca.

[4] Corticosteroids: Systemic. In: Compendium of Pharmaceuticals and Specialties. Ottawa, ON: Canadian Pharmacists Association. https://myrxtx.ca.

The correct answer is: Dexamethasone

Question 7

ID: 54031

Incorrect

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All of the following are common side effects of aprepitant, **EXCEPT**:

Select one:

- Constipation ✖
- Hiccups ✖ *Rose Wang (ID:113212) this answer is incorrect. This is a common side effect of aprepitant.*
- Weakness ✖
- Fluid retention ✔

Incorrect

Marks for this submission: 0.00/1.00.

TOPIC: Chemotherapy-Induced Side Effects

LEARNING OBJECTIVE:

To identify the various side effects of anti-emetic medications in chemotherapy-induced nausea and vomiting (CINV).

BACKGROUND:

There are three main drugs used as prophylactic anti-emetics in CINV. They are 5-HT3 receptor antagonists (e.g. ondansetron), neurokinin-1 receptor (NK1R) antagonists (e.g. aprepitant), and glucocorticosteroids (e.g. dexamethasone). Studies have shown that with individual or combination use, these medications are effective in preventing both acute and delayed emesis in the setting of intravenously delivered chemotherapies.

The most common side effects associated with aprepitant are hiccups, weakness, constipation, and diarrhea. 5-HT3 receptor antagonists (i.e. ondansetron, granisetron, palonosetron) are well-tolerated, with headaches and constipation as primary adverse effects. Systemic corticosteroid use, particularly with short-term dexamethasone use, is associated with insomnia, hypertension, and hyperglycemia.

RATIONALE:

Correct Answer:

- **Fluid retention** - This is not a common side effect of aprepitant.

Incorrect Answers:

- **Constipation** - This is a common side effect of aprepitant.
- **Hiccups** - This is a common side effect of aprepitant.
- **Weakness** - This is a common side effect of aprepitant.

TAKEAWAY/KEY POINTS:

Hiccups, weakness, constipation, and diarrhea are common side effects of aprepitant.

REFERENCE:

[1] Hesketh, PJ. Prevention and treatment of chemotherapy-induced nausea and vomiting in adults. In: Drews R, ed. *UpToDate*. Waltham, MA.: UpToDate; 2016. www.uptodate.com.

[2] Serotonin 5-HT3-Receptor Antagonists. In: Compendium of Pharmaceuticals and Specialties. Ottawa, ON: Canadian Pharmacists Association. https://myrxtx.ca.

[3] Emend®. In: Compendium of Pharmaceuticals and Specialties. Ottawa, ON: Canadian Pharmacists Association. https://myrxtx.ca.

[4] Corticosteroids: Systemic. In: Compendium of Pharmaceuticals and Specialties. Ottawa, ON: Canadian Pharmacists Association. https://myrxtx.ca.

The correct answer is: Fluid retention

Question 8

ID: 34032

Incorrect

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Send Feedback

EW is a 35 year old woman with ovarian cancer undergoing treatment with carboplatin chemotherapy.

Which prophylactic anti-emetics should be given to EW based on carboplatin's emetogenicity?

Select one:

- Ondansetron only ✖
- Ondansetron and dexamethasone ✖

Rose Wang (ID:113212) this answer is incorrect. This is not sufficient prophylaxis for carboplatin-induced emesis.

- Ondansetron, dexamethasone, and aprepitant ✔
- Aprepitant only ✖

Incorrect

Marks for this submission: 0.00/1.00.

TOPIC: Chemotherapy-Induced Side Effects

LEARNING OBJECTIVE:

To identify the therapeutic alternatives for anti-emetics in the prevention of CINV.

BACKGROUND:

Chemotherapy-induced nausea and vomiting (CINV) is one of the most common and debilitating side effects of chemotherapy. There are three distinct classifications of CINV: acute, delayed, and anticipatory. Acute emesis refers to nausea and/or vomiting beginning within 1 to 2 hours post-chemotherapy and peaking at 4 to 6 hours. Any emesis occurring more than 24 hours after therapy is defined as delayed emesis. Patients who have experienced significant emesis in previous chemotherapy cycles often experience nausea and/or vomiting prior to treatment, otherwise known as anticipatory emesis.

The risk of emesis occurring during treatment largely depends on the intrinsic emetogenicity of the chemotherapy agent. Other factors like sex (e.g. female), age, and history of alcohol consumption have been associated with higher emesis risk for individual patients, however, these factors are not used in the emetogenic risk classification for chemotherapy.

International guidelines use the following scale to classify the emetogenic potential of chemotherapy agents (without accounting for prophylaxis anti-emetic use):

- Highly emetic: >90% risk of emesis
- Moderately emetic: >30 - 90% risk of emesis
- Low emetogenicity: 10 - 30% risk of emesis
- Minimally emetic: <10% risk of emesis

There are three main drugs used as prophylactic anti-emetics in CINV. They are 5-HT3 receptor antagonists (e.g. ondansetron), neurokinin-1 receptor (NK1R) antagonists (e.g. aprepitant), and glucocorticosteroids (e.g. dexamethasone). Studies have shown that with individual or combination use, these medications are effective in preventing both acute and delayed emesis in the setting of intravenously delivered chemotherapies.

This is a summary table of emetic potential and treatment options:

Emetic Risk Group of Drug	Prevention of ACUTE CINV
High (non-AC)	5-HT3 + DEX + NK1
High (AC)	5-HT3 + DEX + NK1

Moderate (carboplatin)	5-HT3 + DEX + NK1
Moderate (non-carboplatin)	5-HT3 + DEX
Low	5-HT3 or DEX or DOP
Minimal	None

Other medications like olanzapine, metoclopramide and prochlorperazine are also used, either individually or in combination, to confer additional emetic protection. In particular, olanzapine and prochlorperazine are often used as rescue therapy on an "as needed" basis for breakthrough CINV. Treatment for anticipatory emesis includes adequate control of CINV from the first cycle, benzodiazepines, and/or behavioral therapy.

RATIONALE:

Correct Answer:

- **Ondansetron, dexamethasone, and aprepitant** - This is the correct choice based on carboplatin's emetogenicity.

Incorrect Answers:

- **Ondansetron only** - This is not sufficient prophylaxis for carboplatin-induced emesis.
- **Ondansetron and dexamethasone** - This is not sufficient prophylaxis for carboplatin-induced emesis.
- **Aprepitant only** - This is not sufficient prophylaxis for carboplatin-induced emesis.

TAKEAWAY/KEY POINTS:

Carboplatin chemotherapy requires triple anti-emetic therapy with ondansetron, dexamethasone, and aprepitant for the prevention of CINV.

REFERENCE:

[1] Hesketh, PJ. Prevention and treatment of chemotherapy-induced nausea and vomiting in adults. In: Drews R, ed. *UpToDate*. Waltham, MA.: UpToDate; 2016. www.uptodate.com.

[2] Roila F, Molassiotis A, Herrstedt J, et al. MASCC and ESMO consensus guidelines for the prevention of chemotherapy and radiotherapy-induced nausea and vomiting. Ann Oncol. 2016;27:v119-v133.

The correct answer is: Ondansetron, dexamethasone, and aprepitant

Question 9

ID: 54033

Correct

Flag question

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Which one of the following anti-emetic medications may increase the risk of QTc prolongation?

Select one:

- Dexamethasone ✗
- Aprepitant ✗
- Nabilone ✗
- Ondansetron ✓

Rose Wang (ID:113212) this answer is correct. QTc prolongation is a known risk associated with ondansetron.

Correct

Marks for this submission: 1.00/1.00.

TOPIC: Chemotherapy-Induced Side Effects

LEARNING OBJECTIVE:

To understand which anti-emetic medications may cause QTc prolongation.

BACKGROUND:

There are three main drugs used as prophylactic anti-emetics in CINV. They are 5-HT3 receptor antagonists (e.g. ondansetron), neurokinin-1 receptor (NK1R) antagonists (e.g. aprepitant), and glucocorticosteroids (e.g. dexamethasone). Studies have shown that with individual or combination use, these medications are effective in preventing both acute and delayed emesis in the setting of intravenously delivered chemotherapies.

All of the first generation 5-HT3 receptor antagonists (i.e. ondansetron, granisetron, dolasetron) may cause ECG changes and QTc prolongation, which may lead to cases of fatal cardiac arrhythmias like torsade de pointes (TdP). These risks are dose-dependent and route-dependent, specifically for a single 32 mg dose of IV ondansetron. As a result, IV ondansetron doses are capped depending on jurisdiction and special restrictions have been placed on the use of IV ondansetron in select high-risk groups (e.g. geriatric patients).

Dexamethasone, nabilone and aprepitant have also not been associated with prolongation of the QTc interval.

RATIONALE:

Correct Answer:

- **Ondansetron** - QTc prolongation is a known risk associated with ondansetron.

Incorrect Answers:

- **Dexamethasone** - QTc prolongation is not a known risk of this medication.
- **Aprepitant** - QTc prolongation is not a known risk of this medication.
- **Nabilone** - QTc prolongation is not a known risk of this medication.

TAKEAWAY/KEY POINTS:

QTc prolongation is a known risk of ondansetron and other first generation 5-HT3 receptor antagonists.

REFERENCE:

[1] Hesketh, PJ. Prevention and treatment of chemotherapy-induced nausea and vomiting in adults. In: Drews R, ed. *UpToDate*. Waltham, MA.: UpToDate; 2016. www.uptodate.com.

The correct answer is: Ondansetron

Question 10

ID: 54034

Correct

Flag question

Send Feedback

Which of the following physiologic processes induces nausea and vomiting in patients on chemotherapy?

Select one:

- Stimulation of serotonin (5-HT3) receptors on the gastrointestinal tract ✔
- Aggravation of the gastric lining to cause the release of more acid ✖
- Stimulation of dopamine release from the gastric lining ✖
- The release of excess calcium by parietal cells in the gastric lining ✖

Rose Wang (ID:113212) this answer is correct. This is the correct mechanism.

Correct

Marks for this submission: 1.00/1.00.

TOPIC: Chemotherapy-Induced Side Effects

LEARNING OBJECTIVE:

To understand the physiologic processes that cause nausea and vomiting in chemotherapy patients.

BACKGROUND:

It is postulated that chemotherapy and radiotherapy induce nausea and vomiting through the stimulation of serotonin (5-HT3) receptors on the small intestine and the release of serotonin from the chemoreceptor trigger zone (CTZ).

Ondansetron is commonly used for the prevention and treatment of chemotherapy and radiotherapy-induced nausea and vomiting. It is a selective 5-HT3 receptor antagonist that works both peripherally and centrally. Ondansetron blocks pre-synaptic 5-HT3 receptors on the gastric wall and select receptors in the chemoreceptor trigger zone and the peripheral vagal nerve terminals.

Ondansetron is a substrate of many CYP450 enzymes, including CYP3A4 (major), CYP1A2 (minor), CYP2C9 (minor), CYP2D6 (minor), and CYP2E1 (minor).

RATIONALE:

Correct Answer:

- **Stimulation of serotonin (5-HT3) receptors on the gastrointestinal tract** - This is the correct mechanism.

Incorrect Answers:

- **Aggravation of the gastric lining to cause the release of more acid** - This is not the correct mechanism.
- **Stimulation of dopamine release from the gastric lining** - This is not the correct mechanism.
- **The release of excess calcium by parietal cells in the gastric lining** - This is not the correct mechanism.

TAKEAWAY/KEY POINTS:

Chemotherapy induces nausea and vomiting by stimulating serotonin (5-HT3) receptors on the small intestine and releasing serotonin from the chemoreceptor trigger zone (CTZ).

REFERENCE:

[1] Serotonin 5-HT3-Receptor Antagonists. In: Compendium of Pharmaceuticals and Specialties. Ottawa, ON: Canadian Pharmacists Association. https://myrxtx.ca.

The correct answer is: Stimulation of serotonin (5-HT3) receptors on the gastrointestinal tract

Question 11

D: 240137

ncorrect

Flag question

Send Feedback

Which of the following chemotherapy agents has the highest risk for nausea and vomiting?

Select one:

- Oxaliplatin ✖
- Rituximab ✖ *Rose Wang (ID:113212) this answer is incorrect. This is not the most emetogenic.*
- Carboplatin ✖
- Cisplatin ✔

Incorrect

Marks for this submission: 0.00/1.00.

TOPIC: Chemotherapy Induced Side Effects

LEARNING OBJECTIVE:

To understand the emesis risk categorizations of different chemotherapy agents.

BACKGROUND:

Chemotherapy induced nausea and vomiting (CINV) is one of the most common and debilitating side effects of chemotherapy. There are three distinct classifications of CINV: acute, delayed, and anticipatory. Acute emesis refers to nausea and/or vomiting beginning within 1 to 2 hours post-chemotherapy and peaking at 4 to 6 hours. Any emesis occurring more than 24 hours after therapy is defined as delayed emesis. Patients who have experienced significant emesis in previous chemotherapy cycles often experience nausea and/or vomiting prior to treatment, otherwise known as anticipatory emesis.

The risk of emesis occurring during treatment largely depends on the intrinsic emetogenicity of the chemotherapy agent. Other factors like sex (e.g. female), age, and history of alcohol consumption have been associated with higher emesis risk for individual patients, however, these factors are not used in the emetogenic risk classification for chemotherapy.

International guidelines use the following scale to classify the emetogenic potential of chemotherapy agents (without accounting for prophylaxis anti-emetic use):

- Highly emetic: >90% risk of emesis
- Moderately emetic: >30 - 90% risk of emesis
- Low emetogenicity: 10 - 30% risk of emesis
- Minimally emetic: <10% risk of emesis

Examples of highly emetogenic chemotherapies include cisplatin, carmustine, and high-dose cyclophosphamide. Moderately emetogenic therapies include carboplatin, doxorubicin, irinotecan, and oxaliplatin. Low emetogenicity chemotherapies include bortezomib, etoposide, fluorouracil, and paclitaxel. Bleomycin, rituximab, and vinblastine are considered minimally emetogenic. The emetogenicity of therapy also varies with combination therapies. For example, the combination of an anthracycline (e.g. doxorubicin) and cyclophosphamide (AC) is considered to be highly emetic.

There are three main drugs used as prophylactic anti-emetics in CINV. They are 5-HT3 receptor antagonists (e.g. ondansetron), neurokinin-1 receptor (NK1R) antagonists (e.g. aprepitant), and glucocorticosteroids (e.g. dexamethasone). Studies have shown that with individual or combination use, these medications are effective in preventing both acute and delayed emesis in the setting of intravenously delivered chemotherapies.

This is a summary table of emetic potential of drugs and the suggested management:

Emetic Risk Group of Drug	Prevention of ACUTE CINV
High (non-AC)	5-HT3 + DEX + NK1
High (AC)	5-HT3 + DEX + NK1
Moderate (carboplatin)	5-HT3 + DEX + NK1
Moderate (non-carboplatin)	5-HT3 + DEX
Low	5-HT3 or DEX or DOP
Minimal	None

Other medications like olanzapine, metoclopramide and prochlorperazine are also used, either individually or in combination, to confer additional emetic protection. In particular, olanzapine and prochlorperazine are often used as rescue therapy on an "as needed" basis for breakthrough CINV. Treatment for anticipatory emesis includes adequate control of CINV from the first cycle, benzodiazepines, and/or behavioral therapy.

RATIONALE:

Correct Answer:

- **Cisplatin** This is highly emetogenic.

Incorrect Answers:

- **Oxaliplatin** This is not the most emetogenic
- **Rituximab** This is not the most emetogen c.
- **Carboplatin** This is not the most emetogenic.

TAKEAWAY/KEY POINTS:

Cisplatin is a common chemotherapy agent that has a high emetogenic risk

REFERENCE:

[1] Hesketh, PJ. Prevention and treatment of chemotherapy-induced nausea and vomiting in adults. In: Drews R, ed. *UpToDate*. Waltham, MA.: UpToDate; 2016. www.uptodate.com

[2] Roila F, Molassiotis A, Herrstedt J, et al. MASCC and ESMO consensus guidelines for the prevention of chemotherapy and radiotherapy-induced nausea and vomiting. Ann Oncol. 2016;27:v119-v133

The correct answer is: Cisplatin

Question 12

D: >4038

Correct

Flag question

Send Feedback

A colleague asks for your recommendation for a patient, GF, who will have their first round of chemotherapy tomorrow. GF is a 45 year old male with well controlled hypertension and pernicious anemia. GF will be using a combination of vincristine (minimal emetic risk) and epirubicin (moderate emetic risk). Your colleague classified GF as a moderate risk patient and asks for your opinion on any medications that can be offered prophylactically for nausea and vomiting.

Which of the following would be an appropriate recommendation?

Select one:

Dexamethasone for 3 days and olanzapine PRN ✖

Ondansetron on day 1 and dexamethasone on days 1 to 3 ✔

Rose Wang (ID:113212) this answer is correct. Epirubicin is an anthracycline thus dexamethasone should be considered.

Aprepitant, dexamethasone, and ondansetron for 3 days ✖

Dexamethasone on day 1 and prochlorperazine PRN ✖

Correct

Marks for this submission: 1.00/1.00.

TOPIC: Chemotherapy-Induced Side Effects

LEARNING OBJECTIVE:

To identify appropriate prophylactic anti-emetic medications for at risk patients.

BACKGROUND:

Chemotherapy-induced nausea and vomiting (CINV) is one of the most common and debilitating side effects of chemotherapy. There are three distinct classifications of CINV: acute, delayed, and anticipatory. Acute emesis refers to nausea and/or vomiting beginning within 1 to 2 hours post-chemotherapy and peaking at 4 to 6 hours. Any emesis occurring more than 24 hours after therapy is defined as delayed emesis. Patients who have experienced significant emesis in previous chemotherapy cycles often experience nausea and/or vomiting prior to treatment, otherwise known as anticipatory emesis.

The risk of emesis occurring during treatment largely depends on the intrinsic emetogenicity of the chemotherapy agent. Other factors like sex (e.g. female), age, and history of alcohol consumption have been associated with higher emesis risk for individual patients, however, these factors are not used in the emetogenic risk classification for chemotherapy.

International guidelines use the following scale to classify the emetogenic potential of chemotherapy agents (without accounting for prophylaxis anti-emetic use):

- Highly emetic: >90% risk of emesis
- Moderately emetic: >30 - 90% risk of emesis
- Low emetogenicity: 10 - 30% risk of emesis
- Minimally emetic: <10% risk of emesis

Examples of highly emetogenic chemotherapies include cisplatin, carmustine, and high-dose cyclophosphamide. Moderately emetogenic therapies include carboplatin, doxorubicin, irinotecan, and oxaliplatin. Low emetogenicity chemotherapies include bortezomib, etoposide, fluorouracil, and paclitaxel. Bleomycin, rituximab, and vinblastine are considered minimally emetogenic. The emetogenicity of therapy also varies with combination therapies. For example, the combination of an anthracycline (e.g. doxorubicin) and cyclophosphamide (AC) is considered to be highly emetic.

There are three main drugs used as prophylactic anti-emetics in CINV. They are 5-HT3 receptor antagonists (e.g. ondansetron), neurokinin-1 receptor (NK1R) antagonists (e.g. aprepitant), and glucocorticosteroids (e.g. dexamethasone). Studies have shown that with individual or combination use, these medications are effective in preventing both acute and delayed emesis in the setting of intravenously delivered chemotherapies.

This table summarizes chemotherapy agents' emetic risk and the associated management:

Emetic Risk Group of Drug	Prevention of ACUTE CINV
High (non-AC)	5-HT3 + DEX + NK1
High (AC)	5-HT3 + DEX + NK1
Moderate (carboplatin)	5-HT3 + DEX + NK1
Moderate (non-carboplatin)	5-HT3 + DEX
Low	5-HT3 or DEX or DOP
Minimal	None

Other medications like olanzapine, metoclopramide and prochlorperazine are also used, either individually or in combination, to confer additional emetic protection. In particular, olanzapine and prochlorperazine are often used as rescue therapy on an "as needed" basis for breakthrough CINV. Treatment for anticipatory emesis includes adequate control of CINV from the first cycle, benzodiazepines, and/or behavioral therapy.

RATIONALE:

Correct Answer:

- **Ondansetron on day 1 and dexamethasone on days 1 to 3** Epirubicin is an anthracycline thus dexamethasone should be considered

Incorrect Answers:

- **Dexamethasone for 3 days and olanzapine PRN** A 5-HT3 receptor antagonist is required for acute emesis
- **Aprepitant, dexamethasone, and ondansetron for 3 days** This is a regimen used in highly emetogenic chemotherapies.
- **Dexamethasone on day 1 and prochlorperazine PRN** Dexamethasone should be given for at least 3 days to control delayed emesis.

TAKEAWAY/KEY POINTS:

For moderately emetogenic therapies, ondansetron and dexamethasone should be given.

REFERENCE:

[1] Hesketh, PJ. Prevention and treatment of chemotherapy-induced nausea and vomiting in adults. In: Drews R, ed. *UpToDate*. Waltham, MA.: UpToDate; 2016. www.uptodate.com.

[2] Roila F, Molassiotis A, Herrstedt J, et al. MASCC and ESMO consensus guidelines for the prevention of chemotherapy and radiotherapy-induced nausea and vomiting. Ann Oncol. 2016;27:v119-v133.

The correct answer is: Ondansetron on day 1 and dexamethasone on days 1 to 3

Question 13

D 34039

ncorrect

Flag question

Send Feedback

MB is a 50 year old man in your practice with a diagnosis of gastric cancer, receiving neoadjuvant chemotherapy. He presents to the hospital with progressive shortness of breath and is diagnosed with a pulmonary embolism.

What is the best anticoagulation strategy for this patient?

Select one:

- LMWH for 5 days followed by edoxaban ✖ — *Rose Wang (ID 113212) this answer is incorrect. Edoxaban may cause higher rates of bleeding in gastric malignancies*
- Rivaroxaban ✖
- Tinzaparin ✔
- Warfarin ✖

Incorrect

Marks for this submission: 0.00/1.00.

TOPIC: Chemotherapy Induced Side Effects

LEARNING OBJECTIVE:

To understand the appropriate treatment options for deep vein thrombosis (DVT) due to chemotherapy.

BACKGROUND:

A blood clot, also known as thromboembolism, is a serious side effect of cancer and cancer treatment. A venous thromboembolism (VTE) is a blood clot that develops in a blood vessel, called a vein, that carries blood to the heart. It most often develops in the legs, thighs, or pelvis, and this is classified as a deep vein

thrombosis (see image below). However, the blood clot may develop in any vein in the body. A pulmonary embolism (PE) is a blood clot that has traveled from a different location in the body to the lung and can be life-threatening if the clot is large enough to block the blood supply.

The symptoms of DVT include pain, swelling, and redness of calf, leg and/or thigh. The symptoms of PE include shortness of breath, chest pain, tachycardia, coughing up blood, and fainting.

Anticoagulation is indicated for cancer patients with active VTE (PE or DVT). In the acute stage, low molecular weight heparins (LMWH) are preferred as initial therapy over unfractionated heparin (UFH), fondaparinux, or new direct oral anticoagulants (e.g. direct thrombin and factor Xa inhibitors). Following, patients should be treated with anticoagulation, traditionally LMWH, for at least 3 to 6 months. LMWH is preferred over warfarin due to its superior efficacy in reducing the rate of recurrent VTE in numerous studies. The choice of anticoagulant should ultimately be made depending on patient factors like renal function, compliance with daily injections, cost, co-morbidities, life expectancy, and values.

In trials evaluating VTE anticoagulation, the new oral anticoagulants (e.g. rivaroxaban) showed similar efficacy when compared to LMWH but demonstrated higher rates of bleeding events, particularly in patients with gastrointestinal (GI) cancers. Thus it may be appropriate to use the newer oral anticoagulants in patients with low GI bleeding risk and non-GI malignancies.

RATIONALE:

Correct Answer:

- **Tinzaparin** LMWH is the drug of choice for cancer associated VTE.

Incorrect Answers:

- **LMWH for 5 days followed by edoxaban** Edoxaban may cause higher rates of bleeding in gastric malignancies.
- **Rivaroxaban** Rivaroxaban may cause higher rates of bleeding in gastric malignancies.
- **Warfarin** Warfarin is not as effective as LMWH in cancer associated VTE.

TAKEAWAY/KEY POINTS:

New direct acting oral anticoagulants (e.g. rivaroxaban) may increase the risk of bleeding events in patients with GI malignancies requiring VTE anticoagulation.

REFERENCE:

[1] CancerNet. Preventing and treating blood clots. http://www.cancer.net/research-and-advocacy/asco-care-and-treatment-recommendations-patients/preventing-and-treating-blood-clots
[2] Leung M. Management of side effects of chemotherapy and radiation therapy. In: Compendium of Therapeutic Choices. Ottawa, ON: Canadian Pharmacists Association. https://myrxtx.ca.
[3] Bauer, K. Treatment of venous thromboembolism in patients with malignancy. In: Leung L, ed. *UpToDate* Waltham, MA: UpToDate. www.uptodate.com

The correct answer is: Tinzaparin

Question 14

D: 4040

ncorrect

Flag question

Send Feedback

CP is a 74 year old woman followed in your clinic for multiple myeloma. She is currently being treated with lenalidomide and dexamethasone. Today, she presents with unilateral leg edema and erythema. The attending physician astutely orders a venous doppler and CP is diagnosed with deep vein thrombosis.

Which one of the following medications should be prescribed for CP at this time?

Select one:

Fondaparinux ✖

Warfarin ✖

Heparin ✖

Rose Wang (ID 113212) this answer is incorrect. This is not the most appropriate therapy at this time.

Enoxaparin ✔

Incorrect

Marks for this submission: 0.00/1.00.

TOPIC: Chemotherapy Induced Side Effects

LEARNING OBJECTIVE:

To understand the appropriate treatment options for deep vein thrombosis (DVT) due to chemotherapy.

BACKGROUND:

A blood clot, also known as thromboembolism, is a serious side effect of cancer and cancer treatment. A venous thromboembolism (VTE) is a blood clot that develops in a blood vessel, called a vein, that carries blood to the heart. It most often develops in the legs, thighs, or pelvis, and this is classified as a deep vein thrombosis (see image below). However, the blood clot may develop in any vein in the body. A pulmonary embolism (PE) is a blood clot that has traveled from a different location in the body to the lung and can be life-threatening if the clot is large enough to block the blood supply.

The symptoms of DVT inc ude pain, swelling, and redness of calf, leg and/or thigh. The symptoms of PE inc ude shortness of breath, chest pain, tachycardia, coughing up blood, and fainting.

Anticoagulation s indicated for cancer patients with active VTE (PE or DVT). In the acute stage low molecular weight heparins (LMWH) are preferred as in tial therapy over unfractionated heparin (UFH), fondaparinux, or new oral anticoagulants (e.g. direct thrombin and factor Xa inhibitors). Following, patients should be treated with anticoagulation, trad tionally LMWH, for at least 3 to 6 months. LMWH is preferred over warfarin due to its superior efficacy in reducing the rate of recurrent VTE in numerous studies. The choice of anticoagulant should ultimately be made depending on patient factors like renal function, compliance with daily injections, cost, co-morbidities, life expectancy, and va ues.

RATIONALE:

Correct Answer:

- **Enoxaparin** Th s is the most appropriate therapy for CP.

Incorrect Answers:

- **Fondaparinux** This is not the preferred treatment for CP's current setting
- **Warfarin** This is not the most appropriate therapy at this time
- **Heparin** This is not the most appropriate therapy at this time.

TAKEAWAY/KEY POINTS:

Low molecu ar weight heparin is the preferred therapy for acute and long term treatment of VTEs n cancer patients.

REFERENCE:

[1] CancerNet. Preventing and treating blood clots. http //www.cancer.net/research and advocacy/asco-care and treatment recommendations patients/preventing and treating blood clots

[2] Leung M. Management of side effects of chemotherapy and radiation therapy. In. Compendium of Therapeutic Choices. Ottawa, ON: Canadian Pharmac sts Association https://myrxtx.ca.

[3] Bauer, K. Treatment of venous thromboembo ism in patients with malignancy. In: Leung L, ed. *UpToDate* Waltham, MA. UpToDate. www uptodate.com

The correct answer is: Enoxaparin

Question 15

ID: 34041

Correct

Flag question

Send Feedback

PW is a 60 year old man receiving 5-fluorouracil (5-FU) infusion as part of his treatment regimen for anal cancer. The attending physician would like your opinion on the best strategy to prevent 5-FU-induced mucositis.

Which of the following is the most appropriate recommendation for PW?

Select one:

- Cryotherapy (ice chips in the mouth during treatment) ✔ *Rose Wang (ID:113212) this answer is correct. This is the most appropriate recommendation for PW.*
- Use an alcohol based mouthwash prior to treatment ✖
- Acetaminophen 30 minutes prior to treatment and PRN for pain ✖
- Intravenous proton pump inh bitor ✖

Correct

Marks for this submission: 1.00/1.00.

TOPIC: Chemotherapy Induced Side Effects

LEARNING OBJECTIVE:

To dentify prevention strategies for chemotherapy induced mucositis.

BACKGROUND:

Mucositis refers to mouth sores, oral mucositis, or esophagitis It can range n severity from a red, sore mouth and/or gums to open sores that can leave a patient unable to eat. Both chemotherapy and radiation therapy can increase a patient's risk for developing mucositis due to the apoptosis of rapidly dividing cells throughout the entire gastrointestinal tract. A common agent that causes mucositis is 5 fluorouracil (5-FU).

It is recommended to utilize specific techniques to take care of the mouth during cancer treatment. For prevention, cryotherapy (ice chips in the mouth) during chemotherapy is typically used to help reduce inflammation and damage to the oral mucosa. Other alternatives include palifermin for high dose chemotherapy and good oral hygiene (.e. brushing, flossing, non alcoholic mouthwash, salt or bicarbonate rinse). If a patient were to develop mucositis, it can be managed by using a saline rinse or compounded products such as lidocaine, diphenhydramine, nystatin, or dexamethasone.

RATIONALE:

Correct Answer:

- **Cryotherapy (ice chips in the mouth during treatment)** This is the most appropriate recommendation for PW

Incorrect Answers:

- **Use an alcohol-based mouthwash prior to treatment** This is not an appropriate recommendation for PW
- **Acetaminophen 30 minutes prior to treatment and PRN for pain** This is not an appropriate recommendation for PW
- **Intravenous proton pump inhibitor** This is not an appropriate recommendation for PW

TAKEAWAY/KEY POINTS:

Mucositis is a common side effect of 5 fluorouracil and can be prevented with cryotherapy during treatment.

REFERENCE:

[1] CancerNet. Mouth sores or mucositis. http://www.cancer.net/navigating-cancer-care/side-effects/mouth-sores-or-mucositis.

[2] Leung M. Management of side effects of chemotherapy and radiation therapy. In. Compendium of Therapeutic Choices. Ottawa, ON: Canadian Pharmacists Association. https://myrxtx.ca.

[3] Vachani, C. Mucositis: the basics. https://www.oncolink.org/support/side-effects/mucositis/mucositis-the-basics

The correct answer is: Cryotherapy (ice chips in the mouth during treatment)

Question 16

D >4042

Correct

Flag question

Send Feedback

BD is a 35 year old female coming for follow-up at your oncology clinic. She has been experiencing up to 3 loose stools daily since her chemotherapy treatment 3 days ago. Other than her recently diagnosed ovarian cancer treated with 5-fluorouracil, she has a non-significant medical history and currently does not take any other medications. She has been taking oral rehydration therapy, but she wants to ask for your advice on a medication to help better manage her diarrhea.

Which one of the following regimens would you recommend to BD?

Select one:

- Diarrhea from chemotherapy is self-limiting and will improve in 3 days ✖
- Octreotide injection and IV hydration ✖
- Ciprofloxacin 500 mg TID for 7 days ✖
- Loperamide 4 mg STAT then 2 mg every bowel movement ✔

Rose Wang (ID:113212) this answer is correct. This is the standard dosing of loperamide for diarrhea

Correct

Marks for this submission: 1.00/1.00.

TOPIC: Chemotherapy-Induced Side Effects

LEARNING OBJECTIVE:

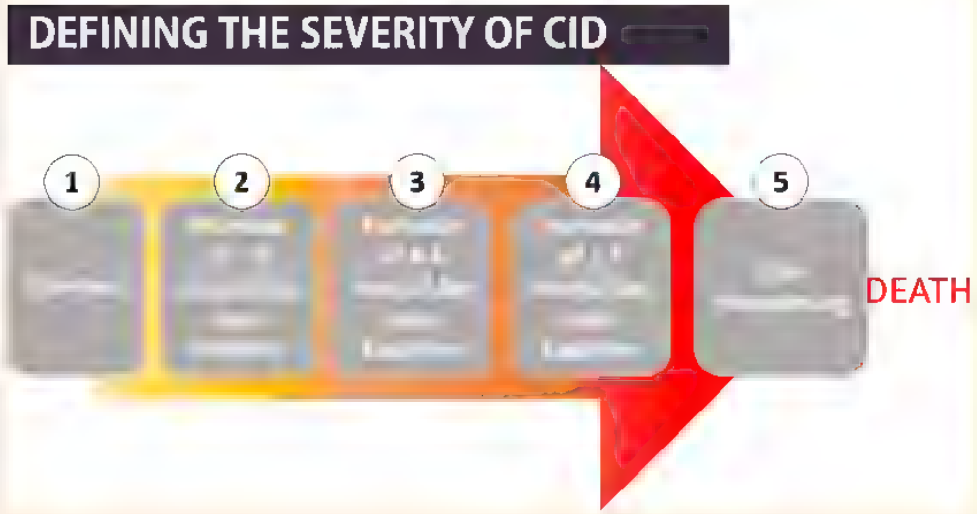
To identify appropriate treatment options for chemotherapy-induced diarrhea (CID).

BACKGROUND:

Chemotherapy-induced diarrhea (CID) is a common side effect caused by chemotherapy agents, especially for patients with advanced cancer. The onset of diarrhea symptoms usually come within days or weeks of initiating chemotherapy. Diarrhea may lead to dehydration, electrolyte imbalance, renal insufficiency, immune dysfunction and in extreme cases, death. Common chemotherapy agents that cause CID include alkylating agents, antimetabolites, irinotecan, platinum compounds, and taxanes. The Common Terminology Criteria for Adverse Events classifies the grade of diarrhea on a scale from one (mild) to five (death) according to the number of stools per day as seen in the image below.

In order to manage CID, chemotherapy is often withheld until symptoms of diarrhea resolve. For non-pharmacologic treatment options, hydration through fluids and consuming a BRAT (bananas, rice, applesauce, and toast) diet may help alleviate symptoms. A standard dose of loperamide (4 mg STAT then 2 mg after every bowel movement) is considered the first-line therapy for CID. However, high-dose loperamide

(4 mg STAT then 2 mg Q2H) is often needed for irinotecan regimens and regimens that are non-responsive to standard dosing. In more severe cases of CID (grade 3-4), IV hydration, an antibiotic and octreotide are suggested treatment options. Atropine does not have evidence for use and is not included within the guidelines for CID.



RATIONALE:

Correct Answer:

- **Loperamide 4 mg STAT then 2 mg every bowel movement** This is the standard dosing of loperamide for diarrhea.

Incorrect Answers:

- **Diarrhea from chemotherapy is self-limiting and will improve in 3 days** This is not an appropriate recommendation
- **Octreotide injection and IV hydration** This is reserved for severe stages of chemotherapy induced diarrhea
- **Ciprofloxacin 500 mg TID for 7 days** Antibiotics are only required in severe cases when standard therapy is not successful

TAKEAWAY/KEY POINTS:

Standard dosing for loperamide is first line therapy for mild to moderate stage chemotherapy induced diarrhea

REFERENCE:

[1] Leung M. Management of side effects of chemotherapy and radiation therapy. In. Compendium of Therapeutic Choices. Ottawa, ON: Canadian Pharmacists Association. https://myrxtx.ca

The correct answer is: Loperamide 4 mg STAT then 2 mg every bowel movement

Question 17

D: >4043

Correct

Flag question

Send Feedback

VF arrives at your clinic and asks about nausea associated with her chemotherapy regimen scheduled for tomorrow. She has heard that chemotherapy can cause severe nausea and vomiting. Her oncologist told her that she was at "minimal risk" for nausea and vomiting after chemotherapy.

Which of the following medications would you recommend to VF as a prophylactic anti-emetic regimen?

Select one:

- No prophylaxis needed ✔ *Rose Wang (ID: 113212) this answer is correct. No routine prophylaxis is needed for minimally emetic chemotherapy regimens.*
- Ondansetron 8 mg BID for 3 days ✖
- Dexamethasone 8 mg daily for 3 days ✖
- Lorazepam 30 minutes before chemotherapy ✖

Correct

Marks for this submission: 1.00/1.00.

TOPIC: Chemotherapy Induced Side Effects

LEARNING OBJECTIVE:

To understand the classifications of chemotherapy induced nausea and vomiting (CINV), the emetogenic risk of different chemotherapies, and anti-emetic treatments

of different chemotherapies, and anti-emetic treatments.

BACKGROUND:

Chemotherapy-induced nausea and vomiting (CINV) is one of the most common and debilitating side effects of chemotherapy. There are three distinct classifications of CINV: acute, delayed, and anticipatory. Acute emesis refers to nausea and/or vomiting beginning within 1 to 2 hours post-chemotherapy and peaking at 4 to 6 hours. Any emesis occurring more than 24 hours after therapy is defined as delayed emesis. Patients who have experienced significant emesis in previous chemotherapy cycles often experience nausea and/or vomiting prior to treatment, otherwise known as anticipatory emesis.

The risk of emesis occurring during treatment largely depends on the intrinsic emetogenicity of the chemotherapy agent. Other factors like sex (e.g. female), age, and history of alcohol consumption have been associated with higher emesis risk for individual patients, however, these factors are not used in the emetogenic risk classification for chemotherapy.

International guidelines use the following scale to classify the emetogenic potential of chemotherapy agents (without accounting for prophylaxis anti-emetic use):

- Highly emetic: >90% risk of emesis
- Moderately emetic: >30 - 90% risk of emesis
- Low emetogenicity: 10 - 30% risk of emesis
- Minimally emetic: <10% risk of emesis

There are three main drugs used as prophylactic anti-emetics in CINV. They are 5-HT3 receptor antagonists (e.g. ondansetron), neurokinin-1 receptor (NK1R) antagonists (e.g. aprepitant), and glucocorticosteroids (e.g. dexamethasone). Studies have shown that with individual or combination use, these medications are effective in preventing both acute and delayed emesis in the setting of intravenously delivered chemotherapies.

This table summarizes the emetic potential of drugs and the management.

Emetic Risk Group of Drug	Prevention of ACUTE CINV
High (non-AC)	5-HT3 + DEX + NK1
High (AC)	5-HT3 + DEX + NK1
Moderate (carboplatin)	5-HT3 + DEX + NK1
Moderate (non-carboplatin)	5-HT3 + DEX
Low	5-HT3 or DEX or DOP
Minimal	None

Other medications like olanzapine, metoclopramide and prochlorperazine are also used, either individually or in combination, to confer additional emetic protection. In particular, olanzapine and prochlorperazine are often used as rescue therapy on an "as needed" basis for breakthrough CINV. Treatment for anticipatory emesis includes adequate control of CINV from the first cycle, benzodiazepines, and/or behavioural therapy.

RATIONALE:

Correct Answer:

- **No prophylaxis needed** - No routine prophylaxis is needed for minimally emetic chemotherapy regimens.

Incorrect Answers:

- **Ondansetron 8 mg BID for 3 days** - No routine prophylaxis is needed for minimally emetic chemotherapy regimens.
- **Dexamethasone 8 mg daily for 3 days** - No routine prophylaxis is needed for minimally emetic chemotherapy regimens.
- **Lorazepam 30 minutes before chemotherapy** - She is not experiencing anticipatory CINV.

TAKEAWAY/KEY POINTS:

No prophylaxis anti-emetic medications are needed for chemotherapy regimens with minimal emetic risk.

REFERENCE:

[1] Hesketh, PJ. Prevention and treatment of chemotherapy-induced nausea and vomiting in adults. In: Drews R, ed. *UpToDate*. Waltham, MA.: UpToDate; 2016. www.uptodate.com.
[2] Roila F, Molassiotis A, Herrstedt J, et al. MASCC and ESMO consensus guidelines for the prevention of chemotherapy and radiotherapy-induced nausea and vomiting. Ann Oncol. 2016;27:v119-v133.

The correct answer is: No prophylaxis needed

Question 18

ID: 54044

FR states that she has been nauseous for the past 10 hours. She mentions she had her last chemotherapy regimen about 18 hours ago. She did not take any prophylactic anti-emetic

Correct

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medications.

Which of the following phases of chemotherapy-induced nausea and vomiting is FR experiencing?

Select one:

- Delayed phase ✖
- Acute phase ✔ — *Rose Wang (ID:113212) this answer is correct. This is when emesis occurs within 24 hours of chemotherapy.*
- Breakthrough phase ✖
- Anticipatory phase ✖

Correct

Marks for this submission: 1.00/1.00.

TOPIC: Chemotherapy-Induced Side Effects

LEARNING OBJECTIVE:

To understand the classifications of chemotherapy-induced nausea and vomiting (CINV).

BACKGROUND:

Chemotherapy-induced nausea and vomiting (CINV) is one of the most common and debilitating side effects of chemotherapy. There are three distinct classifications of CINV: acute, delayed, and anticipatory. Acute emesis refers to nausea and/or vomiting beginning within 1 to 2 hours post-chemotherapy and peaking at 4 to 6 hours. Any emesis occurring more than 24 hours after therapy is defined as delayed emesis. Patients who have experienced significant emesis in previous chemotherapy cycles often experience nausea and/or vomiting prior to treatment, otherwise known as anticipatory emesis.

The risk of emesis occurring during treatment largely depends on the intrinsic emetogenicity of the chemotherapy agent. Other factors like sex (e.g. female), age, and history of alcohol consumption have been associated with higher emesis risk for individual patients, however, these factors are not used in the emetogenic risk classification for chemotherapy. International guidelines use the following scale to classify the emetogenic potential of chemotherapy agents (without accounting for prophylaxis anti-emetic use):

- Highly emetic: >90% risk of emesis
- Moderately emetic: >30 - 90% risk of emesis
- Low emetogenicity: 10 - 30% risk of emesis
- Minimally emetic: <10% risk of emesis

There are three main drugs used as prophylactic anti-emetics in CINV. They are 5-HT3 receptor antagonists (e.g. ondansetron), neurokinin-1 receptor (NK1R) antagonists (e.g. aprepitant), and glucocorticosteroids (e.g. dexamethasone). Studies have shown that with individual or combination use, these medications are effective in preventing both acute and delayed emesis in the setting of intravenously delivered chemotherapies.

Other medications like olanzapine, metoclopramide and prochlorperazine are also used, either individually or in combination, to confer additional emetic protection. In particular, olanzapine and prochlorperazine are often used as rescue therapy on an "as needed" basis for breakthrough CINV. Treatment for anticipatory emesis includes adequate control of CINV from the first cycle, benzodiazepines, and/or behavioral therapy.

RATIONALE:

Correct Answer:

- **Acute phase** - This is when emesis occurs within 24 hours of chemotherapy.

Incorrect Answers:

- **Delayed phase** - This is when emesis occurs greater than 24 hours after chemotherapy.
- **Breakthrough phase** - This is when emesis occurs despite prophylactic treatment.
- **Anticipatory phase** - This is when nausea and vomiting occur before treatment.

TAKEAWAY/KEY POINTS:

Acute phase CINV is classified as emesis that occurs within 24 hours of chemotherapy.

REFERENCE:

[1] Hesketh, PJ. Prevention and treatment of chemotherapy-induced nausea and vomiting in adults. In: Drews R, ed. *UpToDate*. Waltham, MA.: UpToDate; 2016. www.uptodate.com.
[2] Roila F, Molassiotis A, Herrstedt J, et al. MASCC and ESMO consensus guidelines for the prevention of chemotherapy and radiotherapy-induced nausea and vomiting. Ann Oncol. 2016;27:v119-v133.

The correct answer is: Acute phase

Question 19

ID: 34045

Correct

SD is a 29 year old male recently diagnosed with soft tissue sarcoma of the left arm. His past medical history reveals GERD and a fractured ankle 5 years ago. He currently takes pantoprazole 40 mg daily. SD works as an investment banker and due to the stressful nature of his job, has been drinking 4 to 6

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standard alcoholic drinks daily for the last 5 years. The medical oncologist has scheduled SD to start on neoadjuvant chemotherapy.

Which of the following risk factors increases SD's potential for emesis during treatment?

Select one:

- Male gender ✖
- Age ✔

Rose Wang (ID:113212) this answer is correct. Younger patients are more susceptible to CINV than older patients.

- History of high alcohol consumption ✖
- Pantoprazole use ✖

Correct

Marks for this submission: 1.00/1.00.

TOPIC: Chemotherapy-Induced Side Effects

LEARNING OBJECTIVE:

To identify the risk factors that confer higher risk for CINV.

BACKGROUND:

Chemotherapy-induced nausea and vomiting (CINV) is one of the most common and debilitating side effects of chemotherapy. There are three distinct classifications of CINV: acute, delayed, and anticipatory. Acute emesis refers to nausea and/or vomiting beginning within 1 to 2 hours post-chemotherapy and peaking at 4 to 6 hours. Any emesis occurring more than 24 hours after therapy is defined as delayed emesis. Patients who have experienced significant emesis in previous chemotherapy cycles often experience nausea and/or vomiting prior to treatment, otherwise known as anticipatory emesis.

The risk of emesis occurring during treatment largely depends on the intrinsic emetogenicity of the chemotherapy agent. Other factors like sex (e.g. female) and age have been associated with higher emesis risk for individual patients, however, these factors are not used in the emetogenic risk classification for chemotherapy.

International guidelines use the following scale to classify the emetogenic potential of chemotherapy agents (without accounting for prophylaxis anti-emetic use):

- Highly emetic: >90% risk of emesis
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There are three main drugs used as prophylactic anti-emetics in CINV. They are 5-HT3 receptor antagonists (e.g. ondansetron), neurokinin-1 receptor (NK1R) antagonists (e.g. aprepitant), and glucocorticosteroids (e.g. dexamethasone). Studies have shown that with individual or combination use, these medications are effective in preventing both acute and delayed emesis in the setting of intravenously delivered chemotherapies.

Other medications like olanzapine, metoclopramide and prochlorperazine are also used, either individually or in combination, to confer additional emetic protection. In particular, olanzapine and prochlorperazine are often used as rescue therapy on an "as needed" basis for breakthrough CINV. Treatment for anticipatory emesis includes adequate control of CINV from the first cycle, benzodiazepines, and/or behavioral therapy.

RATIONALE:

Correct Answer:

- **Age** - Younger patients are more susceptible to CINV than older patients.

Incorrect Answers:

- **Male gender** - Females are at higher risk for emesis.
- **History of high alcohol consumption** - History of alcohol consumption confers lower emesis risk.
- **Pantoprazole use** - This is not a risk factor for emesis.

TAKEAWAY/KEY POINTS:

Younger patients are more susceptible to CINV than older patients.

REFERENCE:

[1] Hesketh, PJ. Prevention and treatment of chemotherapy-induced nausea and vomiting in adults. In: Drews R, ed. *UpToDate*. Waltham, MA.: UpToDate; 2016. www.uptodate.com.

[2] Roila F, Molassiotis A, Herrstedt J, et al. MASCC and ESMO consensus guidelines for the prevention of chemotherapy and radiotherapy-induced nausea and vomiting. Ann Oncol. 2016;27:v119-v133.

The correct answer is: Age

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